WE CLAIM:

1. A method for assessing muscle damage in a subject, comprising:
obtaining a biological sample from a subject being assessed for muscle damage;
evaluating for the presence or absence of a myofilament protein modification product in the biological sample.

2. The method of claim 1, further comprising the step of assessing the amount of the myofilament protein modification product present in the biological sample, as an indication of the extent of muscle damage in the subject.

3. The method of claim 1, wherein the evaluating step comprises detecting the presence of at least two different myofilament protein modification products in the biological sample.

4. The method of claim 3, further comprising the step of assessing the amounts of said at least two different myofilament protein modification products present in the biological sample, and comparing the amounts as an indication of the extent of muscle damage in the subject.

5. The method of claim 3, wherein said at least two different myofilament protein modification products are from the same protein.

6. The method of claim 3, wherein said at least two different myofilament protein modification products are from different proteins.

7. The method of claim 6, further comprising the step of assessing the ratio of said at least two different myofilament protein modification products, as an indication of the extent of muscle damage in the subject.

8. The method of claim 1, wherein the step of evaluating for the presence or absence of a myofilament protein modification product comprises incubating the biological sample with a compound which specifically binds to the myofilament protein modification product, under conditions which allow the compound to form a complex with the myofilament protein modification product, and detecting the complex.

9. The method of claim 8, wherein the compound is selected from the group consisting of an antibody, a functional fragment of an antibody, a protein, a protein fragment, a peptide, and a peptidomimetic.

10. The method of claim 8, wherein the complex is detected by assaying for the presence of a label.

11. The method of claim 8, wherein the compound is labelled with an enzyme which is detected by measuring enzymatic activity associated therewith.

12. The method of claim 11, wherein the enzyme is selected from the group consisting of alkaline phosphatase, horseradish peroxidase, luciferase, beta-galactosidase, lysozyme, glucose-6-phosphate dehydrogenase, lactate dehydrogenase, and urease.

13. The method of claim 8, wherein the compound is immobilized on a solid phase.

14. The method of claim 13, wherein the solid phase is a plastic surface.

15. The method of claim 1, wherein the muscle is selected from the group consisting of cardiac muscle and skeletal muscle.

16. The method of claim 15, wherein the muscle damage is reversible.

17. The method of claim 16, wherein the muscle damage is due to at least one condition selected from the group consisting of hypoxia, hypoxemia, ischemia, and reperfusion.

18. The method of claim 15, wherein the muscle damage is irreversible.

19. The method of claim 18, wherein the muscle damage is due to at least one condition selected from the group consisting of hypoxia, hypoxemia, ischemia, and reperfusion.

20. The method of claim 1, wherein the myofilament protein modification product is from at least one myofilament protein selected from the group consisting of troponin I, troponin T, troponin C, α-actinin, and myosin light chain 1.

21. The method of claim 1, wherein the myofilament protein modification product is a covalent complex comprising at least two polypeptides, at least one of said polypeptides being an intact protein or a fragment of a protein selected from the group consisting of troponin I, troponin T, troponin C, α-actinin, and myosin light chain 1.

22. The method of claim 8, wherein the muscle is cardiac muscle and the myofilament protein modification product in troponin I.

23. The method of claim 22, wherein the compound binds to a region of troponin I comprising all or a portion of the amino acid sequence from residue 194 to residue 210.

24. The method of claim 22, wherein the compound binds to a region of troponin I comprising all or a portion of the amino acid sequence from residue 1 to residue 193.

25. The method of claim 8, wherein the myofilament protein is myosin light chain 1.

26. The method of claim 25, wherein the compound binds to a region of myosin light chain 1 comprising all or a portion of the amino acid sequence from residue 20 to residue 199.

27. The method of claim 25, wherein the compound binds to a region of myosin light chain 1 comprising all or a portion of the amino acid sequence from residue 1 to residue 19.

28. The method of claim 1, wherein the biological sample is selected from the group consisting of cardiac muscle tissue, a component of cardiac muscle tissue, blood, blood serum, skeletal muscle tissue, a component of skeletal muscle tissue, and urine.

29. A kit for assessing the extent of muscle damage in a biological sample obtained from a subject, comprising:

a compound which specifically binds to a myofilament protein modification product to form a complex; and

instructions explaining how to use the kit to assess muscle damage in a biological sample obtained from a subject.

30. The kit of claim 29, wherein the compound is selected from the group consisting of an antibody, a functional fragment of an antibody, a protein, a protein fragment, a peptide, and a peptidomimetic.

31. The kit of claim 29 further comprising a label which binds to the complex.

32. The kit of claim 31 further comprising at least one reagent for detecting the label.

33. The kit of claim 29, wherein the myofilament protein modification product is from at least one myofilament protein selected from the group consisting of troponin I, troponin T, troponin C, myosin light chain 1, and α-actinin.

34. The kit of claim 29, wherein the myofilament protein modification product is a covalent complex comprising at least two polypeptides, at least one of said polypeptides being an intact protein or a fragment of a protein selected from the group consisting of troponin I, troponin T, troponin C, α-actinin, and myosin light chain 1.

35. The kit of claim 31, wherein the label is an enzyme which is detected by measuring the enzymatic activity associated therewith.

36. The kit of claim 32, wherein the enzyme is selected from the group consisting of alkaline phosphatase, horseradish peroxidase, luciferase, beta-galactosidase, lysozyme, glucose-6-phosphate dehydrogenase, lactate dehydrogenase, and urease.

37. A method of screening for an agent which modulates the level of a myofilament protein modification product present in a biological sample, comprising:

providing a biological sample containing a myofilament protein modification product from a subject;

testing at least a portion of the biological sample with an agent; and

determining the effect of the agent on the level of the myofilament protein modification product in the biological sample.

38. The method of claim 37, wherein the level of the myofilament protein modification product is determined using a compound which binds specifically to the myofilament protein modification product.

39. The method of claim 37, wherein the myofilament protein modification product is from at least one myofilament protein selected from the group consisting of troponin I, troponin T, troponin C, myosin light chain 1, and α-actinin.

40. The method of claim 37, wherein the myofilament protein modification product is a covalent complex comprising at least two polypeptides, at least one of said polypeptides being an intact protein or a fragment of a protein selected from the group consisting of troponin I, troponin T, troponin C, α-actinin, and myosin light chain 1.

41. A method for assessing muscle damage in a subject, comprising:

obtaining a biological sample from a subject being assessed for muscle damage;

incubating the biological sample with at least one compound which specifically binds to one or more different myofilament proteins or myofilament protein modification products present in the sample, under conditions which allow the compound to form one or more complexes with the myofilament proteins or myofilament protein modification products;

detecting said one or more complexes; and

characterizing the profile of said one or more myofilament proteins or myofilament protein modification products contained in said one or more complexes, as an indication of the extent or type of muscle damage in the subject.

42. The method of claim 41, wherein the detecting step comprises detecting at least one complex containing two different myofilament protein modification products.

43. The method of claim 41, wherein the myofilament protein modification product is from at least one myofilament protein selected from the group consisting of troponin I, troponin T, troponin C, myosin light chain 1, and α-actinin.

44. The method of claim 41, wherein the myofilament protein modification product is a covalent complex comprising at least two polypeptides, at least one of said polypeptides being an intact protein or a fragment of a protein selected from the group consisting of troponin I, troponin T, troponin C, α-actinin, and myosin light chain 1.

45. The method of claim 41, wherein said one or more complexes is detected in an ELISA.

46. The method of claim 41, wherein the step of characterizing the profile of said one or more different myofilament proteins or myofilament protein modification products comprises performing an immunoblot analysis.

47. The method of claim 41, wherein the step of characterizing the profile of said one or more different myofilament proteins or myofilament protein modification products comprises performing an HPLC analysis.

48. The method of claim 41, wherein the step of characterizing the profile of said one or more different myofilament proteins or myofilament protein modification products comprises performing a polyacrylamide gel electrophoresis analysis.

49. The method of claim 41, wherein the step of characterizing the profile of said one or more different myofilament proteins or myofilament protein modification products comprises comparing the sizes of the proteins or modification products.

50. The method of claim 41, wherein the step of characterizing the profile of said one or more different myofilament proteins or myofilament protein modification products comprises comparing the amounts of the proteins or modification products.

51. The method of claim 41, wherein the myofilament protein modification products are from the same protein.

52. The method of claim 41, wherein the myofilament protein modification products are from different proteins.

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